



COLORADO

Oil & Gas Conservation
Commission

Department of Natural Resources

1120 Lincoln Street, Suite 801
Denver, CO 80203

APR 21 2015

emailed 4/17 → sent as day

Mr. Douglas Minter
Unit Chief, UIC Program
U.S. EPA - Region 8
Mail Code: 8P-W-UIC
1595 Wynkoop St.
Denver, Colorado 80202-1129

*1120 Lincoln Street, Suite 801
Denver, Colorado 80203*

April 15, 2015

RE: Wasatch Formation: Aquifer Exemption Request
Encana Oil & Gas (USA) Inc.
Wieben 2-13 (M2SW), API: 05-045-09364
TR-43 (SWSW) Section 2 Township 8 South, Range 93 West 6th P.M.

Dear Mr. Minter,

Encana Oil & Gas (USA) Inc ("Encana") has filed an application for a water disposal well, the Wieben 2-13 (M2SW), for injection into the Wasatch Formation through perforations from 3,730 to 5,910 ft. MD. This is a conversion of a production well drilled in October 2003. A sample of formation water from the Wasatch Formation in the Encana MCU Disposal #3 well (API: 05-045-10146) approximately 1.4 miles to the southeast had a Total Dissolved Solids value of 8200 mg/L. Encana is working on the assumption that a Wasatch water sample from the Wieben 2-13 (M2SW) would have a similar TDS value and is therefore requesting an aquifer exemption for the Wasatch. Note that the Wasatch Formation in the MCU Disposal #3 well was granted an aquifer exemption on December 10, 2012 (U.S. EPA Ref: 8P-W-UIC). Wasatch Formation water analyzed from a third disposal well, the MCU Disposal #1 (API: 05-045-11225), had TDS values from 15,000 to 16,000 mg/L. The MCU Disposal #1 (now plugged and abandoned) lies about 0.9 miles to the northeast of the Wieben 2-13 (M2SW) with Wasatch perforations from 4,108 to 4,962 ft. MD.

Encana is currently preparing to run a Cement Bond Log ("CBL"). A CBL was run in December 2003 but was not calibrated correctly so Encana offered to rerun the log.

This exemption shall apply only to the Wasatch Formation in all of the SW $\frac{1}{4}$ of Section 2, E $\frac{1}{2}$ of the SE $\frac{1}{4}$ of Section 3, NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 10, and N $\frac{1}{2}$ of the NW $\frac{1}{4}$ of Section 11, of Township 8 South, Range 93 West, 6th P.M., Garfield County, Colorado. A map of the proposed aquifer exemption is enclosed.

An Aquifer Exemption Evaluation checklist is enclosed. The checklist was been filled out by Encana whose entries are in red font. I expect you or Ms. Wendy Cheung will contact me with questions or requests for additional information.

P 303.894.2100 F 303.894.2109 www.colorado.gov/cogcc

Commissioners: Thomas L. Compton - Chairman, Richard Alward, John H. Benton, DeAnn Craig,

James W. Hawkins, Tommy Holton, Andrew L. Spielman, Mike King, Dr. Larry Wolk

John W. Hickenlooper, Governor | Mike King, Executive Director, DNR | Matthew J. Lepore, Director



Mr. Douglas Minter

April 15, 2015

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Please review this letter and the enclosures. If you or your staff have any questions please feel free to contact me by telephone or email. I will provide original text files and PDF documents of the enclosures. The Colorado Oil request for this exemption.

Sincerely,



Robert P. (Bob) Koehler, PhD.

UIC-Lead Geology Advisor

Telephone: 303-894-2100 x5147

Email: bob.koehler@state.co.us

Enclosures:

Aquifer Exemption Map

Aquifer Exemption Checklist

Aquifer Exemption Evaluation

Regulatory Agency: Colorado Oil and Gas Conservation Commission (COGCC) 1425 Program

Date of Aquifer Exemption Request: March 19, 2015

Substantial or Non-Substantial Program Revision: Non-Substantial

Basis for Substantial or Non-Substantial Determination: This AE request is considered non-substantial, consistent with EPA Guidance 34.

Operator:

Well Class/Type: Class II SWD Well

Well/Project Name: Wieben 2-13 (M2SW)/MCU Disposal 5

Well/Project Permit Number: N/A

Well API number: 05-045-09364

Field: Mamm Creek

Tribal Reservation: N/A

Well/Project Location: Qtr: TR 43 [SWSW] Section: 2 Township: 8S Range: 93W

Footage Call: 871 feet from (S) line 728 feet from (W) line

County: Garfield

State: CO

Latitude: 39.388030

Longitude: -107.748030

(decimal degree, 5-decimals)

DESCRIPTION OF PROPOSED AQUIFER EXEMPTION (depths are approximate values at the well bore)

Aquifer to be Exempted: Molina Member of Wasatch Formation
feet **Top:** 3,700 feet **Bottom:** 5,921

Lithology:

Aquitard: Sand (30%) / Mudstone (60%)	2865' to 3700' MD
Aquifer: Sand (60%) / Mudstone (30%)	3700' to 5930' MD
Aquitard: Sand (30%) / Mudstone (60%)	5930' to 6195' MD

Water Quality – TDS (mg/L): 8,200 mg/L **Source of WQ Data:** Water analysis from MCU Disposal #2 (P11SW) Wasatch injection zone, 4,562'-5,208' MD, located 1.4 miles from proposed conversion well.

Areal Extent and Description of Exempted Aquifer (i.e. radial distance, encompassed TSR)

Total Area of Aquifer to be Exempted: 774 Acres

Description: SW¼ of Section 2, E½ of the SE¼ of Section 3, NE¼ of the NE¼ of Section 10, and N½ of the NW¼ of Section 11, of Township 8 South, Range 93 West, 6th P.M., Garfield County, Colorado.

Confining Zone(s):

Aquitard Top Wasatch - Shire Gulch Member to Top Wasatch G/ Molina	2865' to 3700' MD
Aquitard Base Wasatch - Atwell Gulch Member to Top Mesaverde	5930' to 6195' MD

BACKGROUND

USDW(s): There are no fresh water wells identified within two (2) mile of the proposed injection well.

Injectate Characteristics: Produced water from nearby Oil & Gas wells in Mamm Creek. Analysis provided by Accutest Laboratories show TDS values ranging from 11,400 – 19,000 mg/L. The analysis were completed on samples pulled from Encana's: Hunter Mesa Water Treatment Facility, Benzel Water Treatment Facility, and High Mesa Water Treatment Facility.

BASIS FOR DECISION

Regulatory Criteria under which the exemption is requested

146.4: ☒ (a) Not currently used as a drinking water source and:

There are no existing fresh water wells identified within two miles of the proposed injection well. This information was obtained from the Colorado Division of Water Resources-Glenwood District Office. The existing source of underground water in this area is the Wasatch formation but at depths that are typically under 200 ft. There have been no sources of drinking water identified that currently draw in the proposed injection interval for the proposed disposal well.

☐ **(b)(1)** It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or Class II operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible; or

Not Applicable

☒ **(b)(2)** It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; or

The depth to the base of the Wasatch formation is 5,921 ft MD. To drill and complete a well in the Wasatch formation would cost approximately \$2,000,000.00. It is therefore economically or technologically impractical to render the water fit for human consumption.

☒ **(b)(3)** It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or

The total dissolved solids content for this formation at this depth, as stated previously, is ~8,200 mg/L TDS and therefore not fit for drinking water without some type of water treatment to remove the dissolved solids to a level fit for human consumption.

Encana currently runs a Dissolved Air Flotation system at the Hunter Mesa facility nearby which treats produced water of approximately this quality to lower hydrocarbons and solids content but does not remove the TDS. The additional cost to upgrade this facility to lower the TDS and meet drinking water standards (20,000 bpd facility) is estimated to cost \$50,000,000 with significant operating costs of approximately \$1,800,000 per month.

It is therefore economically impractical to access a formation with this water quality for drinking water purposes.

☒ **(c)** TDS is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.

An analysis of the Wasatch in the MCU Disposal #2 (P11SW) was obtained and its TDS concentration was measured at 8,200mg/l. The MCU Disposal #2 (P11SW) is located 1.4 miles from the proposed conversion well.

It is also not reasonable for this water to be used to supply a public system or for an individual well as it is located in South Mamm Creek which is a remote location and there are more easily accessible surface waters or shallower aquifers in the area that have better quality.

The nearest major city or town in the area is Rifle, which is located ~10+ miles to the north of the well site, near the Colorado River and Interstate 70. As Rifle and surrounding towns continue to grow, the most economic and plentiful source of water will continue to be the Colorado River. Water rights are owned by the city and surrounding land owners; purchasing and trading water from other water right holders in the basin is common practice and will continue to supply the water needs of these communities for years to come.

Describe what assurance exists to confine fluids within the AE boundary:

- Discuss injection rate or volume limitation
 - Proposed Injection Plan:
 - Injection Rate Range: 250 - 10,000 BWPD
 - Injection Pressure Range: 25 -1500 PSI
 - County: Garfield
- Discuss existence and quality of confining zone(s). (Is the confining zone continuous, are there known fractures?)

Tops associated with the Aquitard and Aquifers are defined at or near the transition points from >60% mudstone (30% sand) environments to >60% sand (30% mud) and back again at depth. This transition is a function of the stream channel environment and sand load of the system at the time of deposition over very long periods of geologic time. The nature of the resulting sand bodies vary from tabular sheet sands in the Confined Aquifer (more connected spatially) to lenticular highly discontinuous sand lenses in the Aquitards.

Public Comment

Public Comment Conducted? ☐ Yes ☐ No

Results of Public Comment Process:

Checklist of Questions to Consider (PLEASE ANSWER)

- ☐ **Are there deeper aquifers with poorer quality water that can be used for injection (disposal wells)?**

The proposed inject zone exhibits gas shows while drilling which would render the fluids in the zone not potable. Human consumption would be a health risk. The gas saturation is very low in the injection zone. No non-productive deeper zones should be used for injection disposal. Injection may increase future drilling risk in the productive zones. Productivity of the high gas saturated productive zones would be diminished.

- ☐ **Proximity to other jurisdictional boundaries?**

No, the proposed injection well is not within La Plata or Montezuma counties and therefore not within close proximity to jurisdictional boundaries.

- ☐ **Is seismicity a concern in the area?**

No, the Piceance Basin NW Colorado is seismically stable as evidenced by numerous Seismicity magnitude maps available online and at the Colorado Geologic Survey.

- ☐ **Will injection of fluids cause any original formation fluid or injectate to migrate to any known USDW?**

No, the Aquitard above the injection zone and the lack of horizontal permeability in the discontinuous silt and mudstones in the injection zone allow fluid injection with little to no vertical or spatial migration.

□ Are all wells within the AE boundary and AOR properly cemented to prevent preferential flow paths?

No, not all wells within the AE boundary and AOR are properly cemented to prevent preferential flow paths. The wells have cement above all producing zones and cemented surface casings. However, Encana plans to remediate the HMU 10-1(M2SW) to cover the proposed injection interval for the Wieben 2-13 (M2SW). The HMU 10-1 will be squeezed up from the current Top of Cement ("TOC") at 5,500' MD to 3,715' MD, which is 200' above the equivalent of the top perf in the Wieben 2-13 proposed at 3,730' MD.

Provide other considerations to support aquifer exemption approval:

Encana: Wieben #2-13 (M2SW) (API: 045-09364)

